The Vector Electric Field Investigation on the C/NOFS Satellite

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We provide an overview of the Vector Electric Field Investigation (VEFI) on the Air Force Communication/Navigation Outage Forecasting System (C/NOFS) satellite, a mission designed to understand, model, and forecast the presence of equatorial ionospheric irregularities. VEFI is a NASA/GSFC instrument funded by the Air Force Research Laboratory whose main objectives are to: 1) investigate the role of the ambient electric fields in initiating nighttime ionospheric density depletions and turbulence; 2) determine the quasi-DC electric fields associated with abrupt, large amplitude, density depletions, and 3) quantify the spectrum of the wave electric fields and plasma densities (irregularities) associated with density depletions typically referred to as equatorial spread-F. The VEFI instrument includes a vector electric field double probe detector, a fixed-bias Langmuir probe operating in the ion saturation regime, a flux-gate magnetometer, an optical lightning detector, and associated electronics. The heart of the instrument is the set of detectors designed to measure DC and AC electric fields using 6 identical booms that provide 3 axis, 20-m tip-to-tip orthogonal double probes. Each probe extends a 10 cm diameter sphere containing an embedded preamplifier. VEFI also includes a burst memory that enables snapshots of data from 1-8 channels of selected instruments to be sampled at rates of up to 32 kHz each. The bursts may be triggered by the detection of density depletions, intense electric field wave activity in a given band, lightning detector pulses, or an event at a pre-determined time or location. All VEFI instrument components are working exceptionally well. A description of the instrument, its sensors, and their sampling frequencies and sensitivities will be presented. Representative measurements will be shown.